

# The "Kangaroo," a Submarine Freak

Baby Submersible, Carried by Mother Vessel, to Be Used in Shallow Waters—Inventors Evolve Strange and Wonderful Contrivances to Bring Undersea Supremacy

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THE first submarine on record, built by an enterprising subject of King James I. of England, was constructed of wood and propelled by oars extending through holes in the sides of the craft. These oar holes were made water tight by goat skins. Just what finally became of this original submarine is not known. After that the world heard nothing of such craft for about 100 years, and then another inventor, a man named Day, developed the next undersea craft. Day claimed that he could remain submerged in his submarine for twenty-four hours. Once he made ready for this test and apparently was successful, because up to the present moment no one has heard of his coming up.

The next submarine was invented by Dr. David Bushnell, a New Englander who lived at Saybrook, during the Revolutionary war. He called his submarine the "American Turtle." He built this vessel with the idea of destroying the British fleet which was anchored off New York. The Turtle was provided with a torpedo which was attached to the bottom of the ship and manipulated by means of a screw in the interior of the vessel.

One day he set forth with the idea of sinking the frigate Eagle, a vessel of sixty-four guns. The torpedo failed to work because when the Turtle got beneath the Eagle the screw caught in some scrap iron. The torpedo floated away, and as it was operated by a clockwork mechanism it exploded at the time set. The explosion threw the harbor into an uproar. Frightened skippers weighed anchor and sailed away to Sandy Hook for safety.

It is said that Bushnell met with bitter opposition from naval officers. He was so hounded, according to the story, that he left the country and wandered for years in foreign lands. Finally in his old age he returned to this country and went to Georgia, where he practised medicine under an assumed name.

For a time nothing was heard of submarines until Robert Fulton interested Napoleon Bonaparte in the subject. Through the Emperor's assistance he built his Nautilus. During the civil war submarines came to the fore again. At that time they were called "Davids." The United States steamer Housatonic was sunk by one in Charleston harbor in 1864.

But the United States was not the only country to produce submarine inventors. Zede, Goubet and Drzewiecki bent their energies to produce undersea craft in Europe, while Baker and Holland worked on the same problem in the United States.

## Training War Widows.

THE British Ministry of Pensions is preparing a scheme under which widows of soldiers and sailors can receive training in some occupation whereby they may become partly if not wholly self-supporting. These occupations have not yet been designated, but there are certain callings for which women are well adapted. The scheme will be worked under the Local War Pensions Committee and consideration will be given different local conditions.

After the war there will undoubtedly be an oversupply of stenographers, as many temporary Government officers will be no longer needed with their clerical staffs, and the same will apply to many private businesses. In this and similar occupations training would be restricted to those who have possessed knowledge of the work before marriage and could regain former proficiency. Determining factors will also be her age, education, previous occupation and apparent adaptability and her prospects of success in augmenting her income. A course of training will not be considered advisable where there are children under 16 years of age, unless adequate provision is made for their care.

The fee for the training, exclusive of cost of maintenance if living in the institution in which the training is given, will be paid by the Ministry and will not ordinarily exceed \$1.80 a week. The Ministry may also make a maintenance allowance at a maximum of \$3 per week. A normal training period of three months is contemplated, but in more skilled or semi-professional occupations a longer time will be necessary.

Holland's plans were accepted by the United States in 1900. In 1904 Simon Lake built a successful submarine.

Since the world war began the submarine has come into its own in receiving the attention of inventors. When Alphonse Fernandez of Spain undertook to make his improvement on the submarine he must have had a kangaroo in mind. Mr. Fernandez has invented a submarine which carries another small submarine in a pouch or compartment just as a kangaroo carries its young. His idea was to provide means for carrying on submarine warfare in shallow water. For example, a large submarine cannot navigate a river.

The Fernandez submarine would anchor a short distance from the river and proceed about the business of releasing a small submarine. The "baby" carries torpedoes just as does the mother ship. The torpedoes are loaded on the miniature craft while it is still in the compartment. When the explosives have been loaded on the baby ship and the crew is aboard the large submarine opens the compartment in which the small vessel is kept and releases it so that it can proceed to wreak havoc in waters which the big one could not navigate.

Her errand of destruction accomplished, the baby submarine returns to her mother. By means of a series of signals the mother ship is notified of her approach and makes preparations to admit her to the compartment. If there is a strong current it is not always an easy matter for the small ship to enter, because the rushing water forces it to one side and prevents it from proceeding in a straight line. Mr. Fernandez has foreseen this difficulty and has provided the "baby" with a water tight opening through which one of the crew may pass his arm and by pushing against the side of the compartment straighten a path for her.

As remarkable as is this conception of Mr. Fernandez's, it has not exhausted his resources. He has also designed a submarine which cannot be injured if it is hit by shells. In the event of this submarine being attacked by a merchantman or a man-of-war and the upper section being hit it would not be all up with the Fernandez submarine, as it would with others. The wounded upper section may be discarded. The submarine is hardly inconvenienced.

To discard the upper section it is only necessary to turn a shaft. If all works well it ought not to take more than the proverbial "three shakes of a lamb's tail" to release the wounded upper section.

Some time ago a German U-boat was destroyed by shell fire as, fortunately, many are destroyed. It was said that this vessel was provided with a very ingenious means for cutting through anti-submarine nets. The device, which was not injured by the shell fire, is now said to be in the possession of the British Admiralty. It consists of double sided thin steel flanges which protrude from both sides of the bow. The flanges, operated by electrically controlled gears, are suspended on either side of the bow to a distance of some eighteen feet, which gives them a cutting surface of thirty-six feet in all. They are controlled by an operator within the boat. They are also provided with an automatic device which keeps them in motion the moment the nose of the submarine comes into contact with any obstruction.

Another ingenious device for cutting nets was discovered by the captain of a merchantman whose ship was torpedoed by a submarine. This captain, who was of a mechanical turn of mind, observed the cutting apparatus while he was in a small boat following the torpedoing of his ship, and he made a drawing of the device for the British Admiralty. A set of steel hawsers containing motor driven circular knives were stretched from the bow of the U-boat through the conning tower to the stern. As soon as the boat struck a net the knives would revolve on a flexible shaft like buzz saws. These motor driven knives were about a foot in diameter and were placed about a foot apart on the hawsers.

The problem of ventilation is the most serious one which the designers of submarines have to consider. When the boat is running above water it is driven by Diesel engines. When submerged the submarine is driven by electrical motors which derive their current from storage

batteries. These batteries often give trouble because gases or fumes sometimes escape from the battery compartment and suffocate the crew. The Tunes are so penetrating that they eat into the machinery of the boat and destroy the metal. The submarine of the future will not have a storage battery; it will be propelled by the same engine both on the surface of the water and underneath it. But since submarines are built as they are, inventors are constantly trying to improve the system of ventilation.

Not long ago William G. Bond of Wilmington, Del., invented a means of purifying the air of submarines. Mr. Bond demonstrated his faith in his apparatus by remaining in a test chamber three feet by four feet by six feet for seven hours, during which time the only air he received was that furnished by his apparatus. The Bond method purifies the air by chemical reaction between carbon dioxide and certain solutions exposed to the atmosphere of the chamber. By this means the carbon is absorbed and the oxygen liberated.

A very daring submarine has been invented by Jacob H. Welch of Walla Walla, Wash. It is really a one man affair and depends for success upon the bravery of the operator. The torpedo is an ordinary submarine boat with engine and rudders, but it is directed by mechanical brains. When the torpedo is launched it is controlled by a gyroscope which is really a flywheel spinning at several thousand revolutions a minute. This flywheel loses speed from the moment the torpedo is launched. Although the Whitehead automobile torpedo is the deadliest weapon of modern warfare, it becomes inaccurate at distances of from five to ten miles, which are the distances or ranges at which modern naval battles are fought. Realizing this difficulty, Mr. Welch has devised a torpedo which will be controlled by a pilot.

The Welch torpedo is so constructed that the pilot bearing portion is detachable. It is attached to the main body of the torpedo with levers and controlling devices which are within reach of the operator. The torpedo is provided with an air chamber which is in communication with the atmosphere through a series of vertical tubes. When it is travelling on the surface of the water the compressed air used by the engine is taken from this air chamber. When the torpedo is submerged the air tubes are lowered and the engine draws its gas from a compressed gas tank. The torpedo may be submerged to any required depth at the will of the operator.

When the one man submarine is in striking distance of its prey the pilot operates a rod which separates the torpedo body from the pilot section. As soon as the torpedo has left the pilot the weight of the conning tower portion causes that section to turn over and the top acts as a keel. The pilot can then open the hatchway and proceed back to his vessel.

A somewhat similar device was designed by Commander Davis of the United States Navy a few years ago. This was to contain an explosive charge and was to be guided by a sailor who had little knowledge of fear. Of the two perhaps the torpedo designed by Mr. Welch is the less dangerous. The Welch device can be submerged, but the Davis one could not. It had to be guided against an enemy ship while she was preparing to fire upon it.

It remained for a man who lives far from the sea, Worth R. Barringer of Denver, Col., to invent what he claimed would be the fastest submarine in the world. Mr. Barringer's unique undersea craft is a one man affair. The navigator of this strange craft lies down with his legs projecting into the water behind like the tail of a fish. In the front of the machine are placed two glass windows, one on either side, through which he can see. There is also a telescoping window at the bottom of the nose of the vessel which is so placed that he can guide the vessel wherever he pleases.

Just over the head of the navigator is an engine which drives the propeller. Beneath is a motor which drives the vessel when she is submerged. The ballast tanks with which every submarine must be equipped are placed under the navigator's arm. It is an easy matter for him to take in water if he desires to sink or to expel it if he desires to rise. The operator's arms are encased in rubber sleeves, which

are large enough to permit him to withdraw them whenever it is necessary for him to operate one of the levers which control both engines.

The vessel is very light. It weighs 120 pounds and is so arranged that it can be fastened by straps to the shoulders of the operator so that he can assume any position he desires. In the event of something going wrong with the motor the navigator of this strange craft can propel himself by his own muscle.

Long before the Deutschland made her historic voyages Simon Lake, who invented the first successful submarine, patented a craft which is designed for a blockade runner. This boat can carry contraband cargo. The vessel would be about 350 or 400 feet long and would carry about 5,000 tons of cargo. The peculiar feature of this cargo carrying submarine is that it is provided with wheels so that it may travel on the bottom of a waterway.

In the Lake cargo carrying submersible vessel the quarters for the crew, the engine room, &c., are contained in a water tight cylindrical inner hull. The space between the inner and outer hulls may be flooded with water when the vessel desires to submerge. This water can be blown out very quickly when the vessel is ready to travel on the surface.

Abner R. Neff perfected a device which enables the submarine to be driven under the water by oil burning engines. Mr. Neff claims that his invention will increase the radius of the submarine when submerged as well as its power. He also believes that the ventilation in boats driven by his device will be much superior to those provided with the storage battery system of propulsion. This, of course, makes the vessel much more agreeable for the crew.

Other inventors have tried to devise a means of supplying oxygen to oil engines so that submarines might be propelled by these engines when submerged. Frank Shuman has designed a method of supplying liquefied oxygen which combines with oil to form water and carbonic acid gas, both of which are entirely absorbed by the sea water by discharging them through a kind of sieve consisting of millions of small holes. Oxygen is liquefied by compressing ordinary air and then allowing the oxygen to boil off from it. One of the objections which has been raised against the use of liquefied oxygen on submarines is that if a shell penetrated the tanks the liquefied oxygen would run out, and if it is very cold it would freeze the crew to death if they could not leave the vessel within ten minutes.

Another advantage which Mr. Shuman claims for his invention is that in the event of anything happening to the submarine the large quantity of oxygen carried would enable the crew to remain alive much longer than would be possible under ordinary circumstances. Because of this repairs would be possible and the crew would have far more chance of escaping death than they would in an ordinary submersible.

## Jail to Be Hospital

SOME years ago there was built in Birmingham, Ala., a handsome white building. It was roomy and comfortable, and one could reside there at the expense of the city by merely breaking any one of the many ordinances regarding the peace and safety of the municipality. The city fathers lived in an ever hopeful expectation that some day a wicked person would corrupt Birmingham even as Mark Twain's Hadleyburg was corrupted and that the jail would become the happy home of tramps, grass widowers on a bat and other bacchanalian boosters.

There has been, however, a permanent slump in Birmingham's convict business since prohibition left Alabama an arid waste, except for water, which doesn't count. So they hung the "Nobody Home" sign over the barred gate.

Since everything is good for something and Birmingham's bastille simply would not fill itself to bursting with bad characters, it has been decided to offer the building to the Government as a hospital. An investigation is to be made to determine whether the would-be prison can be utilized for such a purpose. It is stated that the edifice can accommodate 1,000 beds.